

Advancing an Integrated Modeling Collaboratory for the Delta

Background for the November 7, 2023 DPIIC Gathering



**Delta Plan Interagency
Implementation
Committee**

DELTA STEWARDSHIP COUNCIL

- The Delta Plan Interagency Implementation Committee (DPIIC) has a history of promoting collaborative and integrated modeling to support decision-making.
- In recent years, the Delta Science Program, in partnership with DPIIC agencies, has hosted workshops, provided funding, and built partnerships to advance the long-standing vision of an integrated modeling collaboratory.
- In light of rapid, climate-driven change and the need for increased transparency in government processes, it's imperative that the Delta science and management community transition from visioning a collaboratory to implementing one.

What is an Integrated Modeling Collaboratory?

The term "collaboratory" is a fusion of "collaboration" and "laboratory," emphasizing the collaborative and experimental nature of scientific work facilitated by digital tools and platforms. An integrated modeling collaboratory refers to a collaborative environment or platform where researchers, scientists, and experts from diverse disciplines and communities come together to develop, integrate, and use models for simulating and understanding complex systems. It can help to create efficiencies—in developing decision support tools, facilitating participatory planning, and more—by creating a common set of tools, practices, and human resources that serve the broad needs of the Delta science and management community and beyond.

What has been achieved to date?

The concept of an integrated modeling collaboratory in the Delta is not new and has evolved over the past decade. Key milestones toward envisioning and advancing an integrated modeling collaboratory for the Delta include:

- **In 2013**, the Council's Delta Lead Scientist reemphasized long-standing calls for developing a collaborative modeling framework, formalized in the 2013 Delta Science Plan;
- **In 2016**, the Delta Independent Science Board wrote a [letter](#) urging the Department of Water Resources and the State Water Resources Control Board to conduct collaborative modeling to evaluate Delta-wide effects of drought barriers and levee breaks on salinity;
- **In 2018**, building on a recommendation from DPIIC, the Integrated Modeling Steering Committee (IMSC) was formed with the charge of developing a plan for an integrated modeling community;
- **In 2020**, Tetra Tech with guidance from the IMSC, produced a series of [memos](#) on model inventory, integrated modeling approaches, technological challenges and solutions, and modeling best practices;
- **In early 2023**, the Delta Science Program hosted an integrated modeling framework [workshop](#) to implement the IMSC's vision; and
- **In mid-2023**, the Collaboratory for Equity in Water Allocations (COEQWAL), a project-specific approach to implementing a subset of the envisioned collaboratory, was funded by the California State Legislature.

Related Initiatives

While new for the Delta, modeling collaboratories are not new. Similar efforts include:

- **The Chesapeake Community Modeling Program (CCMP)** is a long-term collaborative effort that is dedicated to advancing the cause of accessible, open-source observations and environmental models of the Chesapeake Bay in support of research and management efforts. The CCMP seeks to improve access to data, modeling tools and related resources specific to the Chesapeake Bay, its watershed, and connected environmental systems by fostering collaborative open-source research and communication and agency-academic partnerships.

- **The Community Surface Dynamics Modeling System (CSDMS)**, housed at the University of Colorado, is a virtual community of over a thousand international modeling experts and students who study the dynamic interactions of the lithosphere, hydrosphere, cryosphere, and atmosphere of the Earth's surface. Participating in cross-disciplinary groups, members develop integrated software modules that predict the movement of water, sediment, and nutrients across landscapes and into the ocean. CSDMS includes an open library of models, software, and access to high performance computing.

And now in the Delta, **COEQWAL**—a two-year, \$8.3M project funded through the University of California's Climate Action Grant Program—will use the CalSim3 water systems model to create tools, data, public education, and partnerships that will inform more open and transformative discussions about water operations and management in the Sacramento-San Joaquin River system in a changing climate. The project will also do deep dives into the multifaceted implications of water allocations scenarios for salinity management, drinking water for vulnerable communities, and Chinook salmon recovery.

Benefits of an Integrated Modeling Collaboratory for the Delta

The Delta science and management community is faced with a convergence of conditions that uniquely position it to shift from a visioning phase to an implementation phase of an integrated modeling collaboratory. The conditions include a growing emphasis on inclusivity and transparency in government processes, an increasing need for integrated modeling to improve forecasting and advance planning in light of rapid, climate-driven change, and major recent funding and in-kind commitments by state and federal entities and water users.

Stemming from the 2023 Integrated Modeling Framework workshop, and targeted discussions since, the Delta Science Program has identified a host of benefits that a modeling collaboratory would provide to modelers, agencies and society:

- **Improved cross-disciplinary communications** by providing a space for modelers and managers to learn together;
- **Workforce development**, with respect to recruiting and training modelers with skills and training needed to run statewide operational and planning models;

- **Reducing disagreement** over which models to use for generating projections to support policy development;
- **Supporting modelers** in complying with standards for accessibility and transparency for disseminating models and modeling products;
- **Streamlining the updating of model supports** (e.g., the digitized physical representation of the landscape) for the collective benefit of different models; and
- **More effective models** stemming from new partnerships between modelers.

What's next?

As an independent, neutral arbiter of science, the Delta Science Program is planning to continue to facilitate the scoping and implementation of an integrated modeling collaboratory in the Delta.

As a next step in the evolution of this effort, the Delta Science Program will develop and disseminate a draft implementation strategy for input by key experts, users, potential funders and other interested parties, with the goal of resourcing and establishing a long-term collaboratory that builds off of the implementation of COEQWAL.

For more information

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